

WHAT IS CLAIMED IS:

1. A fuel supply apparatus for an internal combustion engine having a cylinder head, the apparatus comprising:

a fuel injection device for injecting fuel into a cylinder of an internal combustion engine, the injection device having an axial end on a side of a fuel injection port thereof being inserted into the cylinder head of the internal combustion engine;

a fuel transfer pipe inserted with another axial end of the fuel injection device on a side of a fuel flow inlet thereof for transferring the fuel to the fuel injection device;

restricting means for restricting the fuel transfer pipe and the cylinder head from being separated from each other; and

a pressing member interposed between the fuel transfer pipe and the fuel injection device to thereby receive a restricting force of the restricting means for pressing the fuel transfer pipe to a side opposing the cylinder head and pressing the fuel injection device to a side of the cylinder head by a reaction force against the restricting force.

2. The fuel supply apparatus according to Claim 1, wherein the pressing member is held sandwiched by a fuel supply port of the fuel transfer pipe in which the axial end on the side of the fuel flow inlet is inserted and the axial end on the side of the fuel injection port.

3. The fuel supply apparatus according to Claim 2, wherein one and the other of the pressing member and the fuel supply port have a first projection and a first recess fitted with the first projection, respectively.

4. The fuel supply apparatus according to Claim 3, wherein one and the other of the pressing member and the fuel injection port have a second projection and a second recess fitted with the second projection, respectively.

5. The fuel supply apparatus according to Claim 4, wherein one and the other of the second projection and the second recess have a third projection a projecting direction of which differs from a projecting direction of the second projection and a third recess fitted with the third projection, respectively.

6. The fuel supply apparatus according to Claim 1, wherein the pressing member is formed in a shape of surrounding a part of an outer peripheral side region of the fuel injection device less than an entire periphery but no less than a half periphery in a peripheral direction.

7. The fuel supply apparatus according to Claim 1, wherein the pressing member is formed at least partially with a resilient portion for producing the reaction by a resilient deformation.

8. The fuel supply apparatus according to Claim 7, wherein the pressing member includes as the resilient portion a plurality of notches provided in a circumferential direction and arranged in an axial direction of the fuel injection device for promoting the resilient deformation.

9. The fuel supply apparatus according to Claim 7, wherein the pressing member includes as the resilient portion a plurality of rods extending in an axial direction of the fuel injection device, and each rod includes a curved portion curved in a diameter direction of the fuel injection device in an arch-like shape for promoting the resilient deformation.

10. The fuel supply apparatus according to Claim 1, wherein the fuel injection device includes a changing portion a diameter from a center axis of which is changed at an outer peripheral side thereof, and the pressing member is brought into contact with the changing portion at an interposed portion on a side of the fuel injection device.

11. The fuel supply apparatus according to Claim 1, wherein the pressing member presses a portion of the fuel injection device at which a magnetic circuit for driving a valve member is not formed.

12. The fuel supply apparatus according to Claim 1, wherein

the restricting means includes a support member provided to extend from the cylinder head to a side of the fuel transfer pipe and a screw member for fastening the fuel transfer pipe to the support member.

13. The fuel supply apparatus according to Claim 1, wherein the fuel injection device has a flange formed with a pair of flat parallel outer wall surfaces, the pressing member has a part formed with a pair of flat parallel inner wall surfaces, and the outer wall surfaces and the inner wall surfaces are fit each other thereby to restrict rotation between the fuel injection device and the pressing member.

14. A fuel supply apparatus for an internal combustion engine having a cylinder head, the apparatus comprising:

a fuel injection device inserted into an insertion port provided in the cylinder head for injecting fuel into a cylinder of the internal combustion engine; and

a resilient integrating member for integrating the fuel injection device to the cylinder head;

wherein the integrating member includes a first pressing portion and a second pressing portion, the first pressing portion is fixed to the cylinder head for pressing the second pressing portion by being deformed resiliently, and the second pressing portion is arranged between an insertion portion of the fuel injection device inserted in the insertion port and the insertion

portion for pressing a projection projected from the insertion portion to an outer side in a diametric direction to a depth side of the insertion port by receiving a pressing force of the first pressing portion.

15. The fuel supply apparatus according to Claim 14, wherein the first pressing portion is arranged on a side of the second pressing portion opposing the projection.

16. The fuel supply apparatus according to Claim 15, wherein the first pressing portion is formed in a shape of a ring plate surrounding an outer peripheral side of the fuel injection device, the ring plate has a resilient raised part at a diametrically inner side thereof and has a flat part at a diametrically outer side to be fixed to the cylinder head, the second pressing portion is formed in a shape of a cylinder filling an interval between the insertion portion and the insertion port over an entire region in a peripheral direction, and the end on the side opposing the projection is pressed in an axial direction of the fuel injection device by the raised part of the first pressing portion.

17. The fuel supply apparatus according to Claim 14, wherein the fuel injection device includes a valve member for opening and closing a fuel injection port by being reciprocated and a body for containing the valve member and the insertion portion is at least a portion of the body.

18. A fuel supply apparatus for an internal combustion engine having a cylinder head, the apparatus comprising:

a fuel injection device inserted into an insertion port provided in the cylinder head of the internal combustion engine for injecting fuel into a cylinder of the internal combustion engine; and

a resilient integrating member for integrating the fuel injection device to the cylinder head;

wherein the insertion port forms a locking portion by an inner wall thereof and the integrating member is locked by the locking portion to receive a reaction force and presses the fuel injection device to a depth side of the insertion port by the reaction force.

19. The fuel supply apparatus according to Claim 18, wherein the integrating member is arranged in the insertion port.

20. The fuel supply apparatus according to Claim 18, wherein the integrating member is formed to be able to deform resiliently for pressing the locking portion by a recovery force.

21. The fuel supply apparatus according to Claim 20, wherein the integrating member includes a first taper face a diameter of which is increased toward the depth side of the insertion port and which is brought into contact with the locking portion

from the depth side of the insertion port and is locked by the locking portion by pressing the locking portion in a direction of the diameter by the first taper face.

22. The fuel supply apparatus according to Claim 20, wherein the locking portion includes a second taper face a diameter of which is increased toward the depth side of the insertion port and which is brought into contact with the integrating member from the depth side of the insertion port and the integrating member is locked by the locking member by pressing the second taper face in a direction of the diameter.

23. The fuel supply apparatus according to Claim 21, wherein the integrating member is formed in a shape of a snap ring having an opening portion at one location on a periphery thereof for generating the recovery force in the diametric direction by a resilient deformation accompanied by a change in the diameter.

24. The fuel supply apparatus according to Claim 18, wherein the integrating member includes a first positioning portion for positioning the integrating member relative to the cylinder head by being fitted to the insertion port.

25. The fuel supply apparatus according to Claim 24, wherein the integrating member includes a second positioning portion for positioning the fuel injection device relative to the

integrating member by being fitted to a portion of the fuel injection device inserted into the insertion port.

26. The fuel supply apparatus according to claim 18, wherein the integrating member is ring-shaped to surround the fuel injection device peripherally, the integrating member has an outer diameter larger than a normal diameter of the insertion port, and the insertion port has a lock groove in a middle of an axial length thereof to receive the integrating member therein in a pressed manner, the lock groove having a diameter larger than the normal diameter of the insertion port.

27. The fuel supply apparatus according to claim 26, wherein the integrating member is in a plate form, and the lock groove has a tapered wall so that the diameter of the lock groove increases as the wall extends in a direction in which the fuel injection device is inserted in the insertion port.